Abstract: BACKGROUND: An accurate measurement of body composition is important in weight loss and exercise prescription, but the best method is not well determined in overweight women. PURPOSE: To evaluate the validity and reliability of air displacement plethysmography (ADP) to dual energy x-ray absorptiometry (DXA) criterion for body composition measurement in overweight women. METHODS: Twenty-four overweight women (BMI range 25.0-45.6 kg•m²; Mean ± SD: 31.3 ± 5.5 kg•m²) (Caucasian and African American; mean ± SD: Age: 36.6 ± 12.0 yrs; Height: 166.4 ± 5.8 cm; Weight: 86.5 ± 14.2 kg; % Body Fat: 38.5 ± 3.7), were tested after an 8-hour fast. Fat mass (FM), fat free mass (FFM), and percent body fat (%BF) were measured by ADP and compared to values determined by the DXA criterion. The reproducibility evaluation included two measurements that were taken 24-48 h apart. A paired samples t-test was used to test for significant differences in the body composition variables between methods. A one-way ANOVA and mean difference scores were used to calculate reliability. RESULTS: Validity data comparing ADP and DXA demonstrated no significant difference in FM (ADP-DXA FM=0.99 kg; p=0.113) and %BF (1.56 kg; p=0.54), but yielded a significant difference in FFM (1.38 kg; p=0.029). Reliability data for ADP, between the first and second trials showed no significant difference in FM (p=0.168; ICC=0.994; SEM=0.668), FFM (p=0.058; ICC=0.973; SEM=0.892), or %BF (p=0.121; ICC=0.971; SEM=0.813). CONCLUSIONS: For overweight women, ADP was found to be a valid measure of FM and %BF when compared to DXA. FFM was significantly greater for ADP than the DXA criterion. The reliability of ADP was supported for all body composition variables. Use of ADP for body composition measures in overweight women may be advantageous due to the sensitivity to detect change, it’s validity, and low technician error. ADP may be advantageous to measure changes from a diet or exercise intervention. Supported by the Nutrition Obesity Research Center (P30DK056350).

Disclosures: H.L. Wingfield: None.
Background: Identifying valid field methods to measure body composition in overweight and obese individuals is essential for quantifying fat (FM) and fat free mass (FFM) and the associated concomitant health consequences. Purpose: The purpose of this study was to compare the validity of an A-mode ultrasound (US) to the criterion three compartment model (3C) for the measurement of body composition in overweight and obese subjects. Fat mass and FFM were also predicted via the US and 3C model. Methods: Forty overweight and obese healthy men and women (mean ± SD; BMI: 32.2 ± 8.2 kg·m⁻²; Age: 38 ± 12 yrs; Ht: 172.1 ± 11.5 cm; Wt: 94.1 ± 15.2 kg) participated in this study. Body composition was measured once via air displacement plethysmography (ADP; BODPOD®, Life Measurements Inc.) for body density (Bd), and bioelectrical impedance spectroscopy (IMPSFB, Impedimed) for total body water (TBW). The 3C model was used to calculate percent body fat (%BF= [(2.118/Bd - (0.78 × TBW/Body Mass (kg)) - 1.354] × 100). Ultrasound measurements (BodyMetrix, Intelametrix) were also made using an A mode, 2.5-MHz transmitter to determine %BF utilizing the manufacturer’s software. All measurements were made on the right side of the body at 7-sites: chest, subscapular, axilla, tricep, waist, suprailiac and thigh. The 7-site Jackson and Pollock equation was used to determine %BF. Paired samples t-tests were performed to determine significance for %BF, FM, and FFM between the 3C and US values. Results: The %BF measured by the US (28.3 ± 6.6%) was significantly different from %BF measured via the 3C model (33.1 ± 7.6%; p < 0.0005). Fat mass measured by the US (26.6 ± 7.5 kg) was significantly different than FM measured by the 3C model (31.0 ± 8.7 kg; p<0.0005) similarly, FFM as measured by the US (67.5 ± 12.9 kg) was significantly different than FFM measured by the 3C model (63.0 ± 13.2 kg; p<0.0005). Discussion: The US was not found to be a valid measurement of body composition in overweight or obese individuals; %BF and FM was significantly under-predicted, while FM was over-predicted. Although not valid, future studies should examine the reliability of the US due its portability and ease of use. Supported by the Nutrition Obesity Research Center (P30DK056350).

Disclosures: S.N. Fultz: None.
Abstract:
Obesity can be monitored through air displacement plethysmography (BodPod). Evaluation of BodPod use among inner-city residents is limited. **PURPOSE:** This study compared characteristics of new members of a low-cost inner city fitness center who selected a no-cost BodPod assessment (Users) to those who did not (Non-users). **METHODS:** All assessments were optional and also included weight, height, systolic blood pressure (SBP), diastolic blood pressure (DBP), resting heart rate (RHR), body mass index (BMI) and fitness tests (FT). ANOVA and T-tests were used to analyze cross-sectional data. **RESULTS:** There were 468 Users and 179 Non-users, 46.2% were Non-Hispanic Black, 45.5% were Non-Hispanic White, and 8% were in the “other” race category. Users were younger (45.22 ± 15 vs. 48.30 ± 15.4, p<.05), had lower RHR (73.15 ± 10.8 vs. 76.76 ± 13.2, p < 0.001), SBP (124.34 ± 15.0 vs. 125.28 ± 14.6, p=0.48), DBP (75.65 ±10.7 vs. 77.69 ±10.8, p < 0.05), and BMI (32.49 ±9.5 vs. 34.07 ±10.5, p=0.07) than non-users. Users generally had higher FT outcomes (chair stands 15.34 ±5.7 vs. 13.62±4.3, p<0.01; steps 93.15±30.1 vs. 86.22±25.4, p<.001; bicepscurls 18.73±5.7 vs. 17.76±5.18, p=0.06) than non-users. **CONCLUSION:** In this diverse sample, new members with healthier fitness assessments used the BodPod. Helping less fit new members understand the benefits of knowing their body composition may facilitate improving general health/fitness outcomes. Improving the health/fitness of inner-city residents may aid in achieving health equity.

Disclosures: O. Smith: None.
Obese adolescents are at increased risk for developing diabetes, cardiovascular disease and other cardiometabolic diseases. In a recent cross-sectional assessment of sixth-grade girls, we found that waist circumference was the most significant loading factor in identifying cardiometabolic risk. Waist-to-height ratio has also been suggested as a predictor or risk. These associations have been found in heterogeneous groups. PURPOSE: To determine if waist:height is associated with cardiometabolic risk in an obese-only mixed gender cohort of adolescents, and to determine if fitness is associated with risk. METHODS: A fasted blood sample was collected and anthropometric and body composition (air-displacement plethysmography) assessments were completed in obese adolescents entering a family-based weight management program. A subset (n=62) completed VO2 max assessments. Associations were determined via paired, two-tailed Pearson t-tests and deemed significant when p<0.05. RESULTS: 110 obese adolescents (BMI% 98.9 ± 1.0%; 14 ± 2 years of age; 65% female) completed baseline assessments and were included in analysis. Waist:height, BMI% and adiposity% were positively associated with insulin (r=0.432, 0.378, 0.291), hsCRP (0.351, 0.331, 0.401), and both systolic (0.300, 0.314, 0.229) and diastolic (0.279, 0.364, 0.240) blood pressures (p<0.05 all). Waist:height alone was positively associated with glucose (0.189, p<0.05); BMI% alone was negatively associated with HDL (-0.270) and positively with cholesterol (0.193, p<0.05 all). VO2 max (ml·kg·1·min⁻¹) was negatively associated with hsCRP (-0.376) and positively with waist:height, BMI% and adiposity% (-0.388, -0.407, -0.503, p<0.05 all). CONCLUSION: Waist:height, BMI% and adiposity% were associated with several cardiometabolic risk factors in obese adolescents, though association strength varied. Future research should determine if changes in waist:height or BMI% predict alterations of cardiometabolic risk in obese adolescents.

Disclosures: H.B. IglayReger: None.

(BOD POD)
Accelerometers-based activity monitors are commonly used to measure physical activity energy expenditure (PAEE). Newly designed wrist and hip-worn triaxial accelerometers claim to accurately predict PAEE across a wide range of activities. Purpose: To determine if the Nike FuelBand (NFB), Fitbit (FB) and ActiGraph GT3X+ (AG) accurately estimate PAEE in various activities. Methods: 21 healthy, college-aged adults wore a NFB on the right wrist, a FB on the left hip, and AG on the right hip, while performing 17 activities. AG data were analyzed using Freedson’s kcal regression equation. PAEE was measured using the Cosmed K4b2 (K4). Repeated measures ANOVAs were used to compare mean differences in PAEE (kcal/min). Paired sample t-tests with Bonferroni adjustments were used to locate significant differences. Results: For each device, the overall mean difference in PAEE was significantly different from the K4 (NFB, -0.45 ± 2.8, FB, 0.48 ± 2.27, AG, 0.64 ± 2.59 kcal/min, p = 0.01). The NFB significantly overestimated most walking activities (e.g., regular walking; K4, 3.1 ± 0.2 vs. NFB, 4.6 ± 0.2 kcal/min) and activities with arm movements (e.g., sweeping; K4, 3.0 ± 0.8 vs. NFB, 4.7 ± 0.4 kcal/min, p < 0.05). The NFB showed a trend towards overestimating sport activities (basketball, K4; 10.8 ± 0.8 vs. NFB, 12.2 ± 0.5 kcal/min) and underestimated PAEE of most activities with arm movements (e.g., Air Dyne, K4, 5.6 ± 0.2; Fitbit, 0.3 ± 0.2; AG, 0.2 ± 0.1 kcal/min, p < 0.05) (racquetball, K4, 9.6 ± 0.8 kcal/minute vs. FB, 7.4 ± 0.6 kcal/minute, vs. AG, 6.5 ± 0.4 kcal/minute, p < 0.05). Conclusion: The NFB overestimated PAEE during most activities with arm movements and tended to overestimate sport activities, while the hip-worn AG and FB underestimated walking and underestimated activities with arm movements. Overall, the wrist-worn NFB had similar accuracy to the waist-worn tri-axial accelerometers; however, none of the devices were able to estimate PAEE across a wide range of activities.
Session: B-23-Aquatics

Wednesday, May 29, 2013, 1:00 PM - 6:00 PM

Presentation: 528 - Are Incremental 200m Swimming Step Lengths Proper For Assessing Relevant Ventilatory Parameters?

Location: Hall C, Poster Board: 3

Pres. Time: Wednesday, May 29, 2013, 2:00 PM - 3:30 PM

Category: 103. Fitness Assessment, Exercise Training, and Performance of Athletes and Healthy People - Sport Science

Keywords: incremental tests; ventilatory response; swimming

Author(s): Kelly de Jesus¹, Carlo Baldari, FACSM², Karla de Jesus¹, Laura Guidetti, FACSM², João Ribeiro¹, João Paulo Vilas-Boas¹, Ricardo Jorge Fernandes¹. ¹Faculdade de Desporto da Universidade do Porto, Porto, Portugal. ²University of Rome "Foro Itálico", Roma, Italy. (Sponsor: Professor Carlo Baldari and Professor Laura Guidetti University of Rome "Foro Itálico", FACSM)

Abstract: PURPOSE: The intermittent incremental protocol of 2-3min step durations (i.e. 200m) conducted in ecological swimming conditions has been an important method for assessing relevant physiological parameters. However, some researchers suggest steps of, at least, 4min duration to accurately determine the ventilatory response during the nx200m protocol. PURPOSE: To observe if the 200m steps give similar information regarding ventilation parameters, comparing with other step lengths (i.e. 300 and 400m).

METHODS: Six national level swimmers (21.66±1.88years, 73.63±3.67kg, 1.81±0.05m and 13±2.6years of training experience) performed 7x200, 7x300 and 7x400m front crawl protocol variants until exhaustion (with 48h intervals in-between); the speed of each step was common to the three variants, the increments were 0.05m/s and 30s intervals were used; VO₂ was collected bxb (averaged 10s) using a portable gas analyzer (K4b2) connected to the new AquaTrainer respiratory snorkel (Cosmed, Italy). Relevant ventilation parameters were assessed: maximal oxygen uptake (VO₂max), maximal carbon dioxide production (VCO₂max), maximal ventilation (VEmax) and maximal tidal volume (VTmax). Friedman’s test was used to compare protocol’s variants (p≤0.05).

RESULTS: Median and interquartile ranges for VO₂max, VCO₂max, VEmax and VTmax values were similar for 7x200, 7x300 and 7x400m, respectively: 56.3 (50.6-70.4), 54.7 (50.3-59.9) and 52.3 (49.6-55.7)ml/kg/min, 4.2 (3.7-5.6), 3.8 (2.9-4.1), 3.6 (2.2-4.2)/min, 139.7 (107.1-172-8), 134.2(98.7-172.8), 134.5 (96.3-167.4)/min, 3.1(2.3-3.7), 2.8 (2.8-3.5), 2.9 (2.7-3.1) l/breath.

CONCLUSIONS: Current data suggest that shorter step lengths might be used to determine ventilator parameters related with maximal aerobic power swimming intensity. These short step durations are easier to implement and more specific to training and competitive swimming requirements. Grants PTDC/DES/101224/2008-FCOMP-01-0124-FEDER-009577 and CAPES 543110-7/2011.

Disclosures: K.D. Jesus: None.

(K4b2 + Aquatrainner)
Abstract: Lower extremity injury prevention programs focused on reducing the occurrence of traumatic injuries, such as anterior cruciate ligament (ACL) ruptures, have demonstrated positive effects, yet the influence on physical performance measures have not been well documented.

**PURPOSE:** To evaluate the effects of a 10-week off-season injury prevention program on physical performance measures.

**METHODS:** 17 Division I female soccer players (19.2 ± 1.0 years, 1.7 ± 0.1m, 63.1 ± 5.6Kg) performed physiologic, plyometric, and balance tasks at pre- and post-training. Physiologic tasks consisted of a sport-specific graded exercise treadmill test, which included heart rate (HR), blood lactate, and rating of perceived exertion (RPE) assessments (1-10 scale) interspersed between stages and at the end of the test. Body fat percentage (BF) was also assessed using air displacement plethysmography. Plyometric tasks included a countermovement vertical jump test (VJ) and horizontal single leg hop tests (SLH). The Star Excursion Balance Test (SEBT) was utilized to assess dynamic balance, and participants were required to reach in the anterior (ANT), posterior-lateral (PL), and posterior-medial (PM) directions, with scores normalized to leg length (%LL). Each of the plyometric and SEBT tasks were performed for 3 trials each, with the maximal score being recorded. The 10-week injury prevention program was performed on-field, consisting of plyometric and agility drills, for 15-minutes twice per week. Paired samples t-tests were utilized to assess differences between pre- and post-training. Alpha level set at .05.

**RESULTS:** Participants demonstrated significant mean increases pre- to post-training in body mass (1.5 ± 1.2Kg; *p*<.01), end RPE (0.6 ± 0.8; *p*<.01), VJ (2.2 ± 3.5cm; *p*=.02), Left SLH (11.9 ± 20.5cm; *p*=.04), Right SLH (8.0 ± 14.4cm; *p*=.04), Right SEBT ANT (0.02 ± 0.03%LL; *p*<.01). End HR demonstrated a significant mean decrease from pre- to post-training (-6.5 ± 5.1bpm; *p*<.01). Though not significant (*p* >.05) from pre- to post-training, BF decreased (-0.3 ± 1.9%), whereas VO$_{2\text{max}}$ increased (1.5 ± 3.8ml/kg/min).

**CONCLUSION:** Positive results were demonstrated within the physical performance tests; therefore the inclusion of injury prevention programs may help to enhance physical performance while decreasing injury risk factors.

Disclosures: **E.K. Greska:** None
Abstract:
Soccer demands multifactorial analysis and evaluations criteria for specific improvement in athletes profile and performance. Training and nutritional patterns are determinants. Besides athletic issues, health should be the primary focus, and the female athletes are more commonly affected by the female athlete triad.

PURPOSE: The aim of this study was to evaluate the dietary pattern, as well as the resting metabolic rate (RMR) of 18 female (23.7±4 years) elite soccer players. METHODS: Nutritional pattern was analyzed using daily 24 hour records with specific software for quantitative and qualitative data (NUTWIN®). For RMR evaluation, a portable analyzer (K4b2 - COSMED®) were used. For statistical analysis, t student test and ANOVA were used when appropriate, adopting p<0.05 for statistical significance. RESULTS: BMI was 21.6± 3.4kg/m². RMR was 1438.6±423.2kcal/day. Caloric intake was 2151.5±786.8kcal/day. Qualitative analysis showed lower carbohydrate intake (5.1g/kg vs 6-10g/kg DRI) in 70% of the athletes. 60% showed high cholesterol intake (>200mg) and 90% showed high protein intake; branched-chain-aminoacid leucine were above dietary recommended intake (DRI) in 90%. Electrolytes intake, such as sodium, potassium and magnesium were abnormal in 100% of the athletes. Iron intake was under the DRI in 52% of the athletes. CONCLUSION: The present study evidences abnormalities that should be focused on the multidisciplinary matter, avoiding unnecessary supplementation and deleterious dietary patterns, such as high cholesterol, protein and sodium intake and low carbohydrate and iron ingestion, which could lead to decrease in performance, despite health risks, and such evaluations that permits improvements of the athletes should be encouraged. Supported by the Brazilian Olympic Committee.
Hooping has evolved in the last decade from a recreational and cultural activity to one that is touted for its fitness benefits. Purpose: To determine the physiological demands and metabolic cost of hooping. Methods: After obtaining informed consent, twenty-five female subjects predetermined capable of participating in 25 minutes of continuous hooping exercise volunteered for this study. On the second visit to the laboratory the women were measured for body composition by underwater weighing or air-plethysmography. On their last visit to the human performance laboratory, after at least eight hours of sleep and twelve hours post-prandial the participants were measured for resting and hooping metabolic rate using a COSMED K4b² portable indirect calorimetry unit. All measures were taken between 6:00-10:30 am. Results: the participants’ physical characteristics were 35.6 ±14.7 yr; 165.9 ±4.7 cm; 67.2 ±12.8 kg and 30.5 ±6.8 % fat. Mean resting physiological and metabolic characteristics were 81 ±11.7 bt∙min⁻¹; 205 ±35 mlO₂∙min⁻¹; 3.11 ±0.53 mlO₂∙kg⁻¹∙min⁻¹; 0.979 ±0.167 kcal∙min⁻¹. Mean hooping exercise (HE) physiological and metabolic responses were 134.3 ±23 bt∙min⁻¹; 1019.2 ±374 mlO₂∙min⁻¹; 4.9 ±1.8 kcal∙min⁻¹. The mean gross and net energy requirements for the 25-minute HE routine were 122.5 ±45 kcal and 97.5 ±42.7 kcal respectively. Conclusions: Hooping on average requires moderate intensity work similar to moderate rated walking; however, due to its upright weight-bearing nature, the heavier the participant the greater the energy requirement thus requiring intense work from some individuals. For this reason different intensity hooping routines are recommended for individuals with different physical abilities and characteristics.
Abstract:
According to the National Health and Nutrition Examination Survey, there has been a consistent increase in overweight and obesity in adolescents over the past several decades. Overweight teenagers are at a substantially higher risk for obesity later in life which is associated with a myriad of chronic diseases.

PURPOSE: To explore the disease risk indicators in first year college students upon commencement of freshman year.

METHODS: Within the first three weeks of arriving on campus, first year college students (n=2279 male/female; age 18 ± 0.3 yr) were recruited via public advertisements in the newspaper, online, and fliers on campus. Participants were screened for height, weight, BMI (calculated as kg/m$^2$), waist circumference, blood pressure (using an automated cuff), and body composition. Body composition was determined using bioelectrical impedance analysis (BIA) and air-displacement plethysmography (ADP via BODPOD). Participants also completed the International Physical Activity Questionnaire to estimate activity level.

RESULTS: Participants predominantly displayed a healthy BMI (23.3 ± 5.7 kg/m$^2$); 74% were categorized as normal weight, 19% as overweight/obese, and 7% as underweight. Mean waist circumference for males and females was 75.9 ± 7.1 cm and 81.0 ± 12.6 cm, respectively; 12% of students were categorized as having a risk factor associated with high waist circumference. Systolic (119.3 ± 11.9 mmHg) and diastolic (71.5 ± 8.6 mmHg) blood pressure demonstrated that 7% of students were hypertensive, 46% were prehypertensive, and 48% were normotensive. Body composition, determined by BIA (M: 13.3 ± 4.8%, F: 28.4 ± 8.5%) and ADP (M: 13.1 ± 5.4%, F: 28.1 ± 8.0%), indicated that 23-24% of freshmen have excess or risky high body fat. ACSM guidelines for weekly physical activity were met by 72% of participants.

CONCLUSION: These data suggest that nearly three quarters of students arriving on campus have a healthy BMI, waist circumference, body composition, and activity levels. Despite this, more than half of participants demonstrated an elevated blood pressure. In order for universities to develop appropriate interventions, further research is necessary to identify possible causal factors of elevated blood pressure among first year students.

Supported by BGSU College of Education and Human Development

Disclosures: R.J. Leone: None.
Abstract: PURPOSE: This study compares the effect of four different GXT protocols on evaluating ability of individual time trial cyclists, as same as to detects validity of variables to predict the result. METHODS: Eight high level male cyclists performed four GXT on separate days. (A group T25×1:100W+25W×1min; B group T50×1:100W+50W×1min; C group T25×3:100W+25W×3min; D group T50×3:100W+50W×3min). Individual anaerobic threshold (IAT) and power at lactate threshold (PLT) were calculated by Stegman method. Ventilate data were collected and analyzed by cardiopulmonary analyzer (Cosmed Quark). All indexes comparisons were made using two-way ANOVA. Principal component analysis was used to find the key factor impact on the indexes varieties. The correlation between individual time trial results got from tract test and indexes from 4 groups were measured using Correlation Analysis. RESULTS: The ventilate threshold (VT), power at ventilate threshold (PVT) and PLT measured on A group is higher than C group. Interval time is key factor impact on results. The correlations between individual time trial and every index that ventilate index (VT, PVT) of C group are better than others on forecast result (VT R= -0.732 p<0.05; PVT R= -0.774 p<0.05). CONCLUSION: Different protocols show different result of aerobic threshold of cyclist. Interval time is key factor impact on results. To the same protocol, VT, PVT are more sensitive than lactate index. C group protocol is better than other groups to predictive the endurance ability of cyclist on individual time trial. * A vs. C P<0.05; Δ B vs. C P<0.05; [unable to display character: &amp;#9675;] A vs. D P<0.05; [unable to display character: &amp;#9671;] B vs. D P<0.05.

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Disclosures: L. Duan: None.
Abstract:

PURPOSE: Middle distance performance in running is dependent on the ability of deriving high amounts of muscle power from both the aerobic and the anaerobic metabolic energy systems. The purpose of this study was to verify the association between the 1500 m performance and the anaerobic capacity measured by the maximal accumulated oxygen deficit (MAOD) method.

METHODS: 28 national and international level Portuguese runners were assigned to two groups according to season best time (SBT), ELIT (N=13; 26.2 ± 4.0 yr.; 66.1 ±4.2 kg; 1.79 ± 0.06 m; 3:41,00 ± 5,38 min:s) and SUBELIT (N=15; 22.0 ± 3.7 yr.; 62.8 ± 7.4 kg; 1.76 ± 0.08 m; 3:41,00 ± 5.38 min:s). Every runner completed an incremental track test of 5 x 6 min duration and constant velocity steps, in order to establish the submaximal energy cost of running, and also the VO2peak and maximal aerobic velocity (MAV) and a supramaximal track test of 600 m for the estimation of MAOD. Respiratory data was collected breath by breath (K4b2, Cosmed, Italy).

RESULTS: MAOD was significant lower in ELIT than in SUBELIT athletes (29.32 ± 14.84 ml.kg⁻¹ and 99.76 ± 9.72 ml.kg⁻¹, respectively, p=0.04), contrarily to MAV (6.11 ± 0.53 ms⁻¹ and 5.76 ± 0.34 ms⁻¹; p = 0.05) and the VO2peak that did not differ between groups. Estimated aerobic contribution during the 600 m supramaximal track run was 72.92 ± 12.02 % for the ELIT and of only 65.34 ± 6.23 % for the SUBELIT runners. However, submaximal running economy was similar in both groups. When the total group was considered, MAV showed to be the best predictor of 1500 m run performance (r²= 0.26).

CONCLUSIONS: Best 1500 m Portuguese runners, in spite of a good international competitive level, have a markedly aerobic profile, lacking muscle power and sprint adaptations.

Disclosures: F. Alves: None.
Interval Training: Its Effects on Resting Fat Oxidation and Body Composition in Recreationally Active College-Aged Females

Downs, AN., Davis SE., FACSM, Witmer, CA., Sauers, EJ. East Stroudsburg University, East Stroudsburg, PA

Interval training has become a popular training method among the exercise and sport field. It has been shown to cause similar physiological changes to that of endurance training, but little research has been done involving its effects on resting fat oxidation after a running, interval training protocol. **PURPOSE:** The purpose of this study is to investigate interval training and its effects on resting fat oxidation and body composition on recreationally active, college-aged females. **METHODS:** Eight recreationally active women (20.4 years ± 1.3) participated in an interval training protocol for three weeks. Subjects were tested before (PRE), and after the completion of the 3 week training (POST). VO$_{2\text{max}}$ tests were performed using the Bruce protocol to determine baseline measurements. Resting metabolic rate (RMR) was assessed to calculate resting fat oxidation (FAO) using the following equation: (1.67*VO$_2$)-(1.67*VCO$_2$). Body composition was assessed using air displacement plethysmography. The interval training protocol consisted of a 30 second maximum effort sprint followed by a 4.5 minute active recovery, and was repeated a total of six times. Heart rate (HR) and rating of perceived exertion (RPE) were recorded after every sprint, as well as after each recovery. A one-way repeated measures ANOVA was used to analyze data. Statistical significance was set at .05. **RESULTS:** There was no difference between PRE and POST measurements of the following variables: VO$_{2\text{max}}$ - PRE: (41.7mL/kg/min±1.8) POST: (40.3±2.2); RER - PRE: (1.2±.02) POST: (1.2±.03); RMR - PRE: (.92±.03) POST: (.93±.03) FAO - PRE: (.028±.01) POST: (.027±.01). **CONCLUSION:** The present study found that there was no significant difference in resting fat oxidation, or aerobic capacity, after a three-week interval training intervention was implemented on recreationally active females. Further investigation should be done to assess any physiological changes effected by interval training.

Disclosures: A.N. Downs: None.
**Abstract:**

**PURPOSE:** Air displacement plethysmography (ADP) is a well validated method for estimating body composition. Similarly, predictive equations derived from regression techniques on large populations are extensively utilized in estimating resting metabolic rate (RMR). The ADP system utilizes a predictive equation to estimate RMR based on the Nelson 1992 model. However, the accuracy of the predictive model being used has come into question. The aim of this study is to validate the RMR estimation model used by the ADP system against an indirect calorimetry system in addition to other predictive RMR models and to derive a model based on the specific use of measurements from the ADP system.

**METHODS:** Sixty six apparently healthy subjects (25 men, 41 women) participated in the trial. All subjects adhered to the following instructions: Fast 12 hrs prior to the test, no strenuous exercise, nicotine, or alcohol 24 hrs prior to the test, and tight fitting clothing during ADP trial. Each subject layed in a quiet room for 30 min during measurement of RMR via metabolic cart (CART). The first 15 min of RMR data was discarded and the average VO2 of the last 15 min was used as the subject’s RMR. Immediately after the CART RMR, subjects moved directly to the ADP and underwent testing following the manufacturers standardized protocol, and an estimated RMR was obtained. Measures from both ADP and CART were tested against nine other validated models using ANOVA techniques with post hoc testing.

**RESULTS:** The Nelson 1992 model under-predicted RMR compared to CART (p<0.001). An ANOVA identified the Dore 1982 model as the best predictor of RMR compared to the CART measures (p=0.87). However, by sex, the Dore 1982 model under-predicted RMR for men and over-predicted for women when compared to the CART measure (229.2±444 cal and -150±274.5 cal, respectively).

**CONCLUSIONS:** The current model used for ADP RMR estimation under-predicts total caloric needs. The Dore 1982 model more accurately predicted RMR in the entire sample but significantly varied when separated by sex.

**Disclosures:**

B. Miller: None.
Abstract:
There are no studies that compare oxygen consumption between bilateral barbell, unilateral dumbbell and unilateral double pulse cable lifts. Generally, unilateral weight training requires greater stabilization than bilateral weight training and may require greater oxygen consumption at equal workloads. Double pulley cable machines blunt inertia and may require greater oxygen consumption than free weights at equal workloads.

PURPOSE: To compare the oxygen consumption between bilateral barbell, unilateral dumbbell and unilateral double pulse cable weight training.

METHODS: Twelve male volunteers (20.3 ± 3.1 yrs, 75.2 ± 10.5 kg, 179.2 ± 5.7 cm) were assigned to a randomly ordered mode of exercise with each mode of exercise put in every order 4 times. The unilateral dumbbell and unilateral cable workouts were done one limb at a time in an alternating manner. The bilateral barbell workout was done with both limbs working in unison. The workout for each mode included a similar set of 3 exercises (1 set of 15 repetitions per exercise). The same relative resistance was used for each lifting mode with 10-minute rest periods between each mode of exercise. A Cosmed Portable Metabolic System recorded oxygen consumption of each lifter’s workout.

RESULTS: Oxygen consumption during lifting was significantly greater for the unilateral dumbbell (24.12 ml/kg/min) and unilateral cable (22.43 ml/kg/min) vs. the bilateral barbell (18.57 ml/kg/min p<0.01). Unilateral dumbbell was significantly greater than unilateral cable (24.12 vs. 22.43 ml/kg/min p<0.05). Heart rate during exercise was significantly greater in both unilateral exercises compared to barbell exercise (155 vs. 142 bpm p< 0.01). Unilateral workouts took significantly more time than the bilateral workouts (~3 min vs. ~2 min p<0.01).

CONCLUSIONS: Unilateral workouts utilized greater oxygen, took longer to complete, and produced greater relative and absolute oxygen consumption than the traditional bilateral workout. Surprisingly, unilateral dumbbell utilized significantly greater oxygen than unilateral cable during exercise. Under the same workload unilateral dumbbell lifts produces greater oxygen consumption than bilateral barbell lifts. This translates into greater energy expenditure, and possibly greater weight loss and cardiovascular development.
Abstract:

**PURPOSE:** To describe and compare cardiopulmonary, metabolic and perceptual responses of two circuit-type exercise routines completed at similar volumes of both resistance & aerobic exercise.

**METHODS:** A resistance-aerobic interval (RAI) circuit required subjects to alternate a set of 10-12 reps of each resistance exercise (RE) (30 sec.) with 3 min. of aerobic exercise (AE). Intensity of both RE & AE was preset at 65% maximum; 8 RE (leg press, chest press, leg extension, shoulder press, leg curl, lat pulldown, bicep curl, and triceps pushdown) were alternated with 7 bouts of AE. Traditional (Trad) RE followed by AE required subjects to complete all 8 RE before completing 21 minutes of AE. 14 college-aged males completed both circuit routines that were counter-balanced and separated by 5-8 days. HR, VO2 & Ve were collected continuously with a Cosmed K4b2. RPE and blood lactate (bLa) was collected immediately following each set of RE & AE; approximately 30-60 sec. between RE & AE intervals was taken to gather these data. 1RM, VO2max & body composition (BodPod) were measured at least 48 hrs prior to participation in the first circuit routine. Paired t-tests with the Bonferroni adjustment was used to analyze the data.

**RESULTS:** Total energy expenditure (EE) (9.0+-1.6 vs 8.4+-1.6 kcal/min, %VO2max (42.8+-1.7 vs 40.9+-1.6 %), and %HRmax (74.8+-1.7 vs 72.0+-1.8) were significantly higher while Ve (57.5+-8.2 vs 62.7+-10.8 1/min), bLa (3.8+-1.2 vs 5.4+-1.5 mmol/L), and Overall RPE (6.2+-0.9 vs 7.0+-0.9) and averaged RPE across RE & AE intervals (5.9+-0.9 vs 6.9+-1.1) were significantly lower (all p<0.02) during RAI vs. Trad. Total Time was similar (2404+-37 vs. 2395+-14 sec) between circuits.

**CONCLUSIONS:** RAI exercise results in greater EE, and lower Ve and bLa responses and lower perceptions of effort (RPE). These data suggest that alternating a set of RE with 3-min. bouts of AE results in greater EE and lower perceptions of effort as compared to the more typical approach to combining RE and AE. Ventilatory and bLa responses at least partially explain the perceptual responses to an acute bout of combined intervals of resistance and aerobic exercise.

Disclosures:

**R. Gallagher:** None.
**Abstract:**

**PURPOSE:** To determine the accuracy of three commercially available pedometers, the BCF pedometer, Yamax Digi-Walker CW-701 pedometer, and Omron HJ-720 ITC pedometer, as a means to estimate step counts, distance traveled, and kilocalorie (kcal) expenditure during a one mile treadmill walk. **METHODS:** Nineteen subjects aged 19.5±1.5y wore three pedometers on their waistband at the level of the umbilicus and in line with the middle of the thigh. Subjects’ weight and stride length were entered into each pedometer prior to the treadmill walk. To determine the step count accuracy, the researchers counted each step using a tally counter. To determine the accuracy of distance traveled, the subjects walked exactly one mile on a calibrated treadmill. To determine the accuracy of kcal expenditure, subjects wore the Cosmed K4b² portable metabolic analyzer which indirectly measured kcal expenditure. An ANOVA with post-hoc analysis was used to determine differences between the actual and pedometer-estimated values for step count, distance traveled and kcal expenditure. **RESULTS:**

<table>
<thead>
<tr>
<th></th>
<th>Steps</th>
<th>Distance (miles)</th>
<th>Kilocalories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual</td>
<td>2086.7±83.3</td>
<td>1.00±0.0</td>
<td>109.3±17.3</td>
</tr>
<tr>
<td>BCF</td>
<td>1869.4±259.7*</td>
<td>0.81±0.1*</td>
<td>51.0±7.0*</td>
</tr>
<tr>
<td>Yamax</td>
<td>2075.5±83.0</td>
<td>0.93±0.1</td>
<td>85.7±11.0*</td>
</tr>
<tr>
<td>Omron</td>
<td>2085.7±84.7</td>
<td>0.93±0.1</td>
<td>63.2±11.0*</td>
</tr>
</tbody>
</table>

* Significant difference between actual and pedometer estimated values

There were no significant differences between actual steps taken and Yamax and Omron recorded steps (p>0.05). In addition, there were no significant differences between actual distance traveled and Yamax and Omron recorded distance (p>0.05). However, the BCF pedometer significantly underestimated step count (p<0.05) and distance (p<0.05). All three pedometers significantly underestimated kcal expenditure (p<0.05). **CONCLUSIONS:** The Yamax and Omron pedometers can accurately measure step counts and distance, but none of the pedometers accurately estimated kcal expenditure.

**Disclosures:**

**K.A. Smith:** None.

(K4b²)
Anecdotal accounts often promote the weight and fat loss benefits of various supplements. Very few of these products undergo research to examine efficacy and safety claims. PURPOSE: To determine the effect of the multi-ingredient dietary supplement, Prograde Metabolism™ [METABO], on body composition, hip and waist girth, and clinical safety markers in conjunction with an 8-week diet and exercise program. METHODS: Overweight, recreationally active males and females (N=21; M_age = 37.6 ± 11.3 yrs, M_weight = 88.3 ± 17.4 kg, M_%BF = 38.7 ± 7.2%) completed this randomized, placebo-controlled, double-blind study. Subjects consumed 4 capsules per day of METABO (n = 11) or placebo (PLA; n = 10). Following baseline testing, both groups underwent eight weeks of daily supplementation, a calorie restricted diet (500 kcal < RMR x 1.4), and supervised exercise training (three sessions per week). The progressive exercise program consisted of 3 sets of each of 5-7 resistance training exercises at an intensity of 90-100% 10RM followed by 30 min of aerobic exercise at an intensity of 70-85% HRR. Body composition (via BOD POD), hip and waist girth, as well as general markers of health (HR, BP, & comprehensive clinical chemistry panels) were assessed at baseline and post-intervention (T1 & T2). RESULTS: RM ANOVA revealed significant decreases in weight (-2.5 ± 3.9 kg, P = .011), fat mass (-3.8 ± 2.1 kg; P <.001), and %BF (-3.9 ± 1.8%, P <.001), and a significant increase in LBM (2.0 ± 1.9 kg; P = .005) from T1 to T2. Waist (-9.3 ± 6.5 cm, P<.001) and hip (-6.8 ± 6.7 cm, P<.001) circumference were also reduced. There were no significant Group differences (P> .43) in any of the body composition or girth measurements. No differential changes in systemic hemodynamics (HR, SBP, DBP) or clinical blood chemistries were noted from T1 to T2 between groups. CONCLUSIONS: The exercise and diet program produced significant improvements in body composition, including gains in LBM and decreases in fat mass. However, these changes were not enhanced by supplementation with METABO. It is possible that the intensity of the program and the degree of caloric restriction mitigated potential supplement benefits. The lack of negative changes in hemodynamic and clinical markers with a supplement containing stimulants is an additional important finding.

Disclosures:

S.M. Arent: Contracted Research - Including Principle Investigator; Ultimate Wellness Systems, Inc.
**Abstract:**

PURPOSE: To compare percent body fat (%BF) determined by ultrasonography (ULTRA; BodyMetrix BX 2000) and air-displacement plethysmography (ADP) in young adults.

METHODS: %BF was assessed by ULTRA and ADP in 211 young adults (120 women, 91 men; mean ± SD, age = 21.1 ± 2.6 yr; height = 171.2 ± 9.9 cm; body mass = 71.1 ± 15.5 kg). Multiple paired sample t-tests with Bonferroni adjustment (p < 0.017) were performed to compare %BF by ULTRA and ADP for the total sample and by gender.

RESULTS: There was no significant difference in the mean %BF determined by ULTRA and ADP for the total sample (20.7 ± 7.1% vs. 21.4 ± 8.8%, p = 0.09). When examined by gender, similar mean %BF values were observed in the women (25.8 ± 3.9% vs. 25.0 ± 7.2%, p = 0.07) but not in the men (13.9 ± 4.0% vs. 16.6 ± 8.5%, p < 0.001). Despite significant correlations between methods (range: r = 0.77 to 0.80, p < 0.001), all standard error of estimate values (total sample = 5.6%; women = 4.7%; men = 5.1%) exceeded the recommended range for accuracy (<3.5%). In addition, ULTRA tended to overestimate %BF in lean subjects and underestimate %BF in those with higher amounts of fat (total sample: r = 0.33; women: r = 0.72; men: r = 0.81, p < 0.001).

CONCLUSION: Overall, ULTRA produced mean %BF values similar to those of ADP for the total sample supporting the use of this technology for group assessments such as epidemiological applications. However, due to the large intra-individual variability and observed systematic bias, when using ULTRA to measure the %BF of a young adult, we recommend interpreting the result with caution.

**Disclosures:**

C.B. Dixon: None.
PURPOSE: The purpose of this study was to determine the validity of air displacement plethysmography, ultrasound, near-infrared interactance, and skinfold measurements in estimating fat-free mass in elite male rowers. METHODS: Twenty-three elite-level male rowers participated in this investigation. All participants were members of the High Performance Training Center located in Oklahoma City, OK and had a minimum of 4 years of training experience. All body composition assessments were performed on the same day in no particular order, except for hydrostatic weighing (HW), which was measured last. Hydration status was determined prior to all testing using specific gravity via handheld refractometry to ensure proper hydration prior to testing. Fat-free mass (FFM) was evaluated using the four compartment model (4C), which included the measures of total body water (TBW) from bioimpedance spectroscopy (BIS), body volume from hydrostatic weighing (HW), and total body bone mineral (TBBM) via dual energy x-ray absorptiometry (DEXA). Estimates of FFM via air displacement plethysmography (BOD POD®), near infrared interactance (Futrex® 6100/XL), ultrasound (IntelaMetrix BX-2000), and the 3-site Jackson and Pollock skinfold equation (Sum3) were validated against the criterion method, 4C model. The validity, precision, and bias were examined in each of the independent body composition techniques, RESULTS: Significant differences (p<0.001) between the four compartment model (4C) estimates of FFM and all other techniques were observed. The relationship between FFM by the 4C model and by all other techniques significantly deviated from the line of identity, with all independent methods producing large constant error values (4.0kg-8.1kg, p<0.01) and total error values (5.36kg-8.4kg). CONCLUSION: In summary, findings from the study illustrate the need to use multiple compartment models for the estimation of FFM in elite athletes. Due to significant differences in mean estimates of FFM as well as considerable individual differences, the BP, NIR, US, and Sum3 are not recommended for use in this population. Future studies should use multiple compartment models for the estimation of FFM, and include the measurement of TBW and TBBM.
Accurate assessment of changes in body composition is important for detecting changes due to exercise interventions. **PURPOSE:** The purpose of this study was to compare changes in body composition after resistance training as measured by multi-frequency bioelectrical impedance (MF-BIA) versus air displacement plethysmography (ADP).

**METHODS:** Thirty nine men (n=19) and women (n=20) aged 23.7 ± 4.4 years participated in a 12-week resistance training program targeting major muscle groups and designed to increase lean body mass. Percent body fat, fat mass and lean mass were measured via MF-BIA (InBody 520) and ADP (BOD POD) for each subject at baseline and after 12 weeks following an overnight fast and euhydration protocol. **RESULTS:** Compared with ADP, MF-BIA significantly underestimated body fat percentage (-3.7%, p<0.001) and fat mass (-2.8 kg, p<0.001) and overestimated lean mass (+2.6 kg, p<0.001) after training; however, body fat percentage (r=0.932), fat mass (r=0.963) and lean mass (r=0.979) were significantly (p<0.05) correlated between methods. Strikingly the correlations of changes in body composition variables were weak but significant (p<0.05) for body fat percentage (r=0.366) and fat mass (r=0.473) or insignificant (r=0.074). **CONCLUSION:** In conclusion, body composition measures by ADP and MF-BIA are highly correlated; however, they fail to similarly detect changes in body composition brought about by resistance training. **Supported by the Egg Nutrition Center.**

**Disclosures:**
**M. Kern:** Contracted Research - Including Principle Investigator; Mark Kern.
Guidelines for body composition determination via air displacement plethysmography (ADP) include exercise restrictions (no exercise) for 3 hr prior to assessment yet scant, if any, research exists as a basis of support for this guideline. Possible reasons for this guideline include changes in body temperature, body volume via fluid shifts and changes in respiration and metabolism that accompany exercise. PURPOSE: To examine the effect of resistance exercise (RE) on relative (%) body fat determination using ADP within 3 hr of completing the RE. Selected measures were assessed to help explain any potential effect. METHODS: Subjects (N=13) were college-aged (18.8±0.5 yr; 155.6±23.6 lb body wt; BMI=23.4±2.8 kg/m²; mean± SD) volunteers with at least 3 months of recent strength training who completed PAR-Q and an informed consent. The RE exercise program (55.4±8.7 min) consisted of eight different exercises (3 sets to failure per exercise) including upper and lower extremity and core exercises. Relative body fat was determined before and after the RE session along with four skinfold sites, tympanic body temperature and resting metabolic rate (V\textsubscript{max} metabolic system). Dependent t tests were used to probe for significant differences at the p<0.01 level. Values are expressed as mean±standard deviation. RESULTS: Post RE relative body fat was assessed (1.76±0.4 hr) after RE. Pre-post RE relative fat measurements were not significantly different (16.4±6.9 vs. 15.7±7.1 %fat). No significant pre-post differences in body volume and body density supported the relative fat findings (66.43±9.7 vs. 66.12±9.6 L and 1.0623±.2 g/L²). Tympanic body temperature, body weight, resting metabolic rate and SF sum for the four sites were also not significantly different (Pre vs. Post: 97.3±0.51 vs. 97.2±0.56 F; 155.6±23.6 vs. 155.1±23.5 lb; 1577.6±299.6 vs. 1584.1±305.1 kcal; 53.5±15.5 vs. 56.3±12.8 mm, respectively). CONCLUSION: These findings do not support the guideline regarding exercise restriction prior to assessment with respect to resistance exercise. No significant difference in pre-post relative body fat was supported by non-significant differences in the pre-post measures. We conclude it is permissible to assess relative body fat immediately after resistance exercise without any adverse effect on body fat estimation.
Body mass index (BMI) and waist girth are often used as measures of obesity. The CDC states that ‘BMI provides a reliable indicator of body fatness for most people.’ However, there is evidence that BMI can overestimate obesity in muscular athletes and underestimate obesity in older individuals. Clinically, it is important to identify the best indicators of obesity to accurately identify at risk individuals.

**PURPOSE:** The purpose of this study was to examine the relationship between various anthropometric and body composition measures to determine if BMI is a reliable indicator of body fatness in college freshmen.

**METHODS:** Within the first three weeks of arriving on campus, first year college students (n=101; age 18.1 ±0.3 yr; 22 M, 79 F) were screened for height, weight, and waist girth (waist); BMI was calculated as kg·m⁻². Body composition (% fat) was determined using bioelectrical impedance analysis (BIA) and air-displacement plethysmography (ADP by BODPOD) following standard recommendations for each instrument. Correlation coefficients were calculated between waist, BMI, and the two % fat measures for all subjects.

**RESULTS:** Correlations between body composition measures were as follows: BIA vs. waist (r=0.657), BMI (r=0.671), and ADP (r=0.920); ADP vs. waist (r=0.651) and BMI (r=0.621); BMI vs. waist (r=0.922) (p<0.01 for all). When comparing our participants to accepted screening values, 19% were categorized as overweight or obese when using BMI (23.3±5.7 kg·m⁻²) while 12% were identified with a waist circumference (M: 30.7±3.1; F: 31.6±4.9 in) as a positive risk factor. Twenty-three % were categorized as having excess to risky high levels of body fat as measured by ADP (M: 13.3±4.8; F: 28.4±8.5%).

**CONCLUSION:** While significant correlations existed for all measures of body composition the relationships between estimates of % fat (i.e., BIA and ADP) were much stronger than those between % fat and risk factor indicators (i.e., waist and BMI). In addition, % fat identified more individuals at risk for poor health. Therefore, BMI and waist should only be utilized as screening tests when measures of % fat are not available. Identification of those at risk for poor health due to excess levels of body fat should be a primary goal of clinicians, therefore, standard measures of % fat are recommended over waist girth and BMI.

**Disclosures:**

A.L. Morgan: None.
Abstract:
Given the questions surrounding BMI, the need for body composition analysis technology that assesses body fat and fat-free weight has been in high demand. The use of body composition analyzers can become a critical tool in breaking the continual weight loss/weight gain cycle seen in the life’s of millions of Americans daily. While there are a multitude of body composition analyzers available, the accuracy of these analyzers at measuring body composition remains in question. PURPOSE: The purpose of this study was to determine the effectiveness of body composition techniques at determining body fat percentages (%BF).

METHODS: Sixty males and thirty-nine females (mean ± SD) [age: 21±1.49 yr., height: 173.7 ± 9.16 cm., mass: 76.53 ± 20.76 kg., body fat %: 19.347 ± 9.364%] from a moderately-sized, Midwestern university participated in the study. All testing was completed during a single session with the subjects reporting to the laboratory having fasted and restricted fluid intake 4-h prior to testing. Height and weight were obtained followed by six different body composition assessment techniques: Underwater Weighing with predicted residual volume (UWW-Pred), Underwater Weighing with estimated residual volume (UWW-VC), Air Displacement Plethysmography (ADP), Bioelectrical Impedance (BIA) using Tanita analyzer (BIA-Tanita), BIA using Omron lower body analyzer (OmronLB), and BIA using Omron upper body/lower body analyzer (OmronUBLB).

RESULTS: One way ANOVA with repeated measures detected significant differences (p<0.05) in the body fat percentages with post hoc comparisons revealing no differences between UWW-Pred (19.87 ±8.9), BodPod (19.35 ±9.36), BIA-Tanita (19.05 ±7.86). However UWW-VC (21.5 ±8.9), OmronLB (28.4 ±15.3), and OmronUBLB (24.7 ±7.9) were significantly different compared to the other techniques. CONCLUSIONS: The data suggest that %BF can be accurately estimated using various body composition techniques. However, some techniques should be used cautiously since they may yield higher than expected results.
Abstract: Recently, there has been a growing interest in competing in running distances that exceed the marathon. This requires an athlete to predispose some characteristics distinct from those typically associated with shorter distances. However, little research has examined the ultra-marathoners performance, particularly regarding the aerobic power. PURPOSE: To determine and compare the maximal oxygen uptake (VO2max), velocity corresponding to maximal oxygen uptake (vVO2max), respiratory quotient (R), maximal heart rate (HRmax) and maximal blood lactate concentration ([La-]max) between ultra-marathoners and track runners during an intermittent incremental protocol until exhaustion. METHODS: Five ultra-marathoners (36.6±2.8yrs, 68.1±3.9kg, 1.78±5.3m) and five track runners (28.5±4.9yrs, 59.6±7.9kg, 1.72±5.2m) performed 7x800m (1km/h increments and 30s rest between steps for blood lactate collection) until exhaustion. The initial velocity was defined according to the individual runners’ individual performance on the 800m minus seven increments, being controlled by an audio feedback at every 100m. Ventilatory parameters and heart rate were collected breath by breath (averaged 5s) using a portable and telemetric gas analyzer (K4b2, Cosmed, Italy). Comparison between groups was done using Mann-Whitney test (p≤0.05). RESULTS: The following results were obtained: 60.6±3.4 vs. 73.4±3.2 (p<0.01) ml.kg-1.min-1 of VO2max, 17.8±0.9 vs. 21.9±0.37 (p<0.05) km/h of vVO2max, 1.08±0.05 vs. 1.09±0.05 (p>0.05) of R, 178.4±7.1 vs. 185.5±7.9 (p>0.05) bpm of HRmax and 8.8±0.98 vs. 10.4±1.5 (p>0.05) mmol.l-1 of [La-]max, for ultra-marathoners and runners, respectively. CONCLUSION: With the exception of R, all the other parameters (although HRmax and [La-]max only evidenced a tendency) evidence a higher aerobic power in the track runners group. These results suggest a higher predisposition of track runners for high aerobic power performances compared to ultra-marathoners, with these probably more adapted to lower intensities of aerobic performance and with much less longitudinal adaptations corresponding to higher intensities. Supported by SFRH/BD/72610/2010.

Disclosures: A.C. Sousa: None.
Abstract: Training programs utilizing high-speed treadmill sprinting have become common practice in the hockey community to improve skate speed. However, different muscles are recruited in skating as compared to running. It may be beneficial to attain off-ice performance variables to better predict on-ice speed and train accordingly. **PURPOSE:** To determine the effects of a 6-week high speed treadmill running program on skating speed in male and female hockey skaters and to identify the strongest predictors of ice hockey skating speed. **METHODS:** Sixteen collegiate ice hockey players from a NCAA division III program, eight male (Age=19.5 ± 1.1 yrs, ht. = 187.0± 8.1 cm, wt.=77.8 ± 9.0 kg) and eight female (Age=20.1 ± 1.1 yrs, ht. = 166.1± 8.9 cm, wt.=68.8 ± 9.1 kg) participated in this program. Body fat by air displacement plethysmography, 40 yard sprint speed, one repetition max squat press, vertical jump, VO2 maximum, and on-ice 35 meter skating speed were measured prior to sprint training. The athletes completed a six-week training program consisting of high-speed sprinting three days a week. Each sprint session consisted of 4 sets of 20 mph sprints on 0% incline for 20 meters then 4 sets of 20 mph sprints on 0% incline for 50 meters then 4 sets of 20 mph sprints on 10% incline for 20 meters with 90 seconds of rest between each set. Following training, the participants’ performance characteristics were measured again. **RESULTS:** After the six week period both the on-ice speed and off-ice sprint speed produced significant improvements. Average 40 yard dash score improved from 5.99 ± .23 to 5.82 ± .34 (p = 0.00017). Average 35 meter skate score improved from 4.61 ± .19 to 4.47 ± .27 (p = 0.00119). Additionally, this study revealed that the main predictor of 35 meter hockey sprint was 40 yard dash (r = .93) and the analysis created a regression equation to predict on-ice speed based on 40 yard dash time: 35 meter skate time = 0.2795 + 0.7238(40-yard time). The other four off-ice characteristics did not significantly contribute. **CONCLUSIONS:** The use of off-ice sprint training for hockey teams during the off-season has taken on much added importance in the last decade and in this study, 6-weeks of high-speed treadmill training improved both running and skating speed. Supported by Augsburg College URGO program.

Disclosures: A. Clapp: None.
Session: E-22-C cardiac responses to acute exercise

Friday, May 31, 2013, 7:30 AM - 12:30 PM

Presentation: 1976 - Aerobic power comparison between Ultra-Marathoners and Track Runners

Location: Hall C, Poster Board: 40

Pres. Time: Friday, May 31, 2013, 11:00 AM - 12:30 PM

Category: 209. Cardiovascular, Renal and Respiratory Physiology - respiratory

Keywords: VO2max; runners; ultra-marathoners

Author(s): Ana C. Sousa¹, João Ribeiro¹, Marisa Sousa¹, Paulo Colaço¹, Paulo Pires², João Paulo Vilas-Boas¹, Ricardo Fernandes¹. ¹Faculty of Sport, University of Porto, Porto, Portugal. ²APT, Porto, Portugal. (Sponsor: Carlo Baldari, FACSM)

Abstract: Recently, there has been a growing interest in competing in running distances that exceed the marathon. This requires an athlete to predispone some characteristics distinct from those typically associated with shorter distances. However, little research has examined the ultra-marathoners performance, particularly regarding the aerobic power. PURPOSE: To determine and compare the maximal oxygen uptake (VO2max), velocity corresponding to maximal oxygen uptake (vVO2max), respiratory quotient (R), maximal heart rate (HRmax) and maximal blood lactate concentration ([La]-max) between ultra-marathoners and track runners during an intermittent incremental protocol until exhaustion. METHODS: Five ultra-marathoners (36.6±2.8yrs, 68.1±3.9kg, 1.78±5.3m) and five track runners (28.5±4.9yrs, 59.6±7.9kg, 1.72±5.2m) performed 7x800m (1km/h increments and 30s rest between steps for blood lactate collection) until exhaustion. The initial velocity was defined according to the individual runners’ individual performance on the 800m minus seven increments, being controlled by an audio feedback at every 100m. Ventilatory parameters and heart rate were collected breath by breath (averaged 5s) using a portable and telemetric gas analyzer (K4b2, Cosmed, Italy). Comparison between groups was done using Mann-Whitney test (p<0.05). RESULTS: The following results were obtained: 60.6±3.4 vs. 73.4±3.2 (p<0.01) ml.kg⁻¹.min⁻¹ of VO2max, 17.8±0.9 vs. 21.9±0.37 (p<0.05) km/h of vVO2max, 1.08±0.05 vs. 1.09±0.05 (p>0.05) of R, 178.4±7.1 vs. 185.5±7.9 (p<0.05) bpm of HRmax and 8.8±0.98 vs. 10.4±1.5 (p>0.05) mmol.l⁻¹ of [La]-max, for ultra-marathoners and runners, respectively. CONCLUSION: With the exception of R, all the other parameters (although HRmax and [La]-max only evidenced a tendency) evidence a higher aerobic power in the track runners group. These results suggest a higher predisposition of track runners for high aerobic power performances compared to ultra-marathoners, with these probably more adapted to lower intensities of aerobic performance and with much less longitudinal adaptations corresponding to higher intensities.

Supported by SFRH/BD/72610/2010.

Disclosures: A.C. Sousa: None.
Abstract:

PURPOSE: A hallmark characteristic of heart failure (HF) is reduced physical activity (PA) patterns and functional capacity. The relationship between key cardiopulmonary exercise testing (CPX) variables and PA patterns has not been investigated. To evaluate PA patterns in patients with ischemic HF and its relationship to peak oxygen consumption (VO2), the minute ventilation/dioxide carbon production (VE/VCO2) slope and the oxygen uptake efficiency slope (OUES).

METHODS: A cross sectional study was carried out in 16 patients with ischemic HF (age 57 ± 9 years, percent ejection fraction: 31,84 ± 8,26). Subjects wore an accelerometer (Actigraph® GT3X) for six days to measure total steps/day as well as percent time at light, moderate and vigorous PA. A symptom-limited CPX was performed on a treadmill using a ramping protocol (0.5 metabolic equivalents/min). Oxygen consumption (ml.Kg⁻¹.min⁻¹), VCO2 (L/min) and VE (L/min) were collected (K4 COSMED®, Italy) throughout the CPX. Peak VO2 was expressed as the highest 30-second average value obtained during the last stage of the CPX. The VE/VCO2 slope and OUES were obtained by least squares linear regression. One way analysis of variance was used to assess differences between PA patterns at different intensities. Pearson’s correlation was used to assess the relationship between PA and CPX variables. A p-value < 0.05 was considered statistically significant

RESULTS: Subjects performed an average of 9029 steps/day, with the majority of PA performed at light intensity (66.48 ± 6.24%) compared to moderate (28.75 ± 4.39%) and vigorous (4.32 ± 1.01%) intensities (p < 0.05). PA patterns demonstrated a significant correlation with key CPX variables. Total steps correlated with peak VO2 (r = 0.64 p < 0.05), the VE/VCO2 slope (r = -0.72; p < 0.05) and the OUES (0.63; p <0.05). The percent time at light intensity PA correlated with the VE/VCO2 slope (r = 0.58; p < 0.05) and the OUES (- 0.51; p <0.05). The percent time at vigorous intensity PA correlated with peak VO2 (r = 0.55; p < 0.05) and the VE/VCO2 slope (r = -0.52; p < 0.05).

CONCLUSIONS: PA assessed by accelerometer is significantly associated with key CPX variables in patients with HF. These findings suggest PA monitoring may provide insight into functional patterns and identify patients with a higher likelihood for a poor CPX response.
Abstract:
Oxygen consumption (VO$_2$) kinetics in swimming was rarely conducted at the extreme intensity domain, i.e., at paces above VO$_{2\text{max}}$, being an unexplored and challenging task. PURPOSE: To characterize the VO$_2$ kinetics on the shortest swimming competitive event: the 50 m freestyle. METHODS: Six trained swimmers (24.8±8.0 yrs, 170.3±5.3 cm, 63.3±5.4 kg) performed 50 m maximal front crawl, and the VO$_2$ was measured by a K4b$^2$ portable gas analyser connected to the new AquaTrainer snorkel (Cosmed, Italy). VO$_2$ data was fitted using the following mono-exponential model: VO$_2$=VO$_{2\text{Basal}}$exp$^{t/(t\text{ime constant})}$. RESULTS: The duration of the effort was 31.27±3.96 s, and an instantaneous and sudden increase in the VO$_2$ occurred from the beginning of the effort (Fig. 1), with 47.37±9.10 ml/kg/min for VO$_2\text{peak}$ and 23.53±6.30 s of time constant. CONCLUSION: Despite the short duration of the 50 m front crawl event, swimmers were able to attain high values of VO$_2\text{peak}$. Complementarily, the high time constant values reflect the extreme intensity in which the effort occurred, not allowing a VO$_2$ stabilization, as reported for moderate and heavy exercise. Future analysis should focus on the assessment of the aerobic vs anaerobic energy system contribution in this swimming event. ACKNOWLEDGMENTS: SFRH/BD/81337/2011 and PTDC/DES/101224/2008 grants.
**Abstract:**

**PURPOSE:** The purpose of this study was to examine the use of the ActivPAL (AP) and ActiGraph GT3X (AG) for estimating SB during structured and free-living physical activity (PA) in youth. **METHODS:** Twenty-nine boys and 23 girls (mean±SD; age, 12±0.9 yrs; BMI 23.3±5.8 kg m⁻²) performed up to 8 structured activities and approximately 2-hrs of free-living PA. Structured activities were split into 4 categories: lying (5 min), sitting (3 min), standing activities (3 min), and walk/run (3 min). Activity data was collected using an AG, positioned on right hip, AP, and energy expenditure (MET_RMR; activity VO₂ divided by resting VO₂) was measured using a Cosmed K4b². For the AG, two methods to estimate SB were examined: 1) inclinometer function, and 2) < 75 vector magnitude (VM) counts/10 sec, < 25 vertical axis (VA) counts/10 sec, and < 50, 100, 150, and 200 VA counts/min. For the structured activities, the AG and AP outcomes were compared to actual time spent in each activity category and for the free-living activity the AG and AP estimates of SB were compared to the Cosmed (<1.5 MET_RMR). **RESULTS:** Structured PA Categories: The AG inclinometer significantly underestimated actual lying, sitting, standing, and walk/run time by 52.0%, 45.4%, 26.3% and 0.1%, respectively (P<0.05). The AP was within 1.4% of measured standing and walk/run time (P>0.05), but significantly underestimated measured lying/sitting time by 16.8% (P<0.05). The AG SB cut-points per 10 sec and <50 counts/min significantly underestimated measured lying time by 3.6-11.9% (P<0.05) and all AG SB cut-points except <150 and 200 counts/min significantly underestimated measured sitting time by 4.2-13.8% (P<0.05). Free-Living PA: On average, there were 28.2 measured minutes of SB time. All AG and AP estimates of SB time were within ±44.5% of measured SB time (P>0.05). The AG inclinometer and AP were within 0.7% and 4.8% of measured SB time, respectively. The closest AG SB cut-points, compared to measured SB time were <25 VA counts/10 sec (2.2%) and <50 counts/min (4.3%). **CONCLUSION:** The AP, AG inclinometer, and AG SB cut-points of <25 VA counts/10 sec and < 50 counts/min provided the closest estimates of measured SB time during free-living PA in youth. However, the AP was better at discriminating between lying/sitting time and standing time. Study supported by NIH grant 5R21HL093407

**Disclosures:**

S.E. Crouter: None.

PURPOSE: The purpose of this study was to quantify, describe and analyze the cardiovascular and physiological responses of horseback riding, specifically the styles of Western and English horseback riding among intercollegiate female athletes. METHODS: A total of 8 collegiate equestrians were analyzed in both laboratory-based and field-based tests to collect heart rate, VO$_2$, ventilation, hand grip strength, lactate, and blood pressure. Body composition testing was administered through the use of the Bod Pod and a YMCA sub-maximal cycle ergometer test was used to determine baseline physiological responses individual to each subject. Field-based testing consisted of a six minute riding trial at the flat beginning with two minutes with the horse at the walk transitioning to two minutes with the horse at the trot and then transitioning to the final two minutes with the horse at the canter. Each subject was outfitted with the Cosmed K4 b² portable analyzer to collect metabolic data throughout the trial. Pre and post heart rate, blood pressure, and lactate levels were collected. RESULTS: A high degree of variability was found among the collected physiological data during field-based trials, including an average heart rate of 75% HRmax and oxygen consumption ranging from 6.0 and 28.8 ml/kg/min. The average percentage of VO$_2$max achieved during riding trials was 38.30 ± 10.50%. The average highest percentage of VO$_2$max achieved was 53.46 ±14.84%. CONCLUSION: In conclusion, this study shows extreme variations in physiological responses among equestrians with many subjects experiencing close to maximal heart rate levels achieved throughout riding trials. These results highlight the importance of regular medical exams and additional physical fitness training for safety and improved performance.

Disclosures: V.A. Wirth: None.
Abstract:
When exercising on cycle ergometers and treadmills, oxygen (O\textsubscript{2}) consumption and caloric expenditure related to a given exercise intensity can be estimated by means of the metabolic equations (ME) provided by the ACSM. The new Technogym Elliptical Machine (TE) is a new equipment that has been developed to carry out a movement on the sagittal plane along an elliptical trajectory applying alternatively a force on two pedals connected and synchronized with two upper levers. To estimate on TE the O\textsubscript{2} consumption related to a given external power output it was not possible to refer on previously developed ME.

PURPOSE: to create a new ME to predicts on TE O\textsubscript{2} consumption and caloric expenditure from the external power output.

METHODS: A group of 50 healthy individuals (25 male and 25 female; age 35.1 ± 6.1; BMI 22.5 ± 3.6) were enrolled in the study. All subjects executed three familiarization sessions with TE. A graded maximal test was then executed on TE to calculate VO\textsubscript{2} max. O\textsubscript{2} consumption was continuously monitored with a metabolic cart (Cosmed Quark b2, Rome Italy). After two days of rest each subject executed a 4 step exercise protocol; each step lasted 8 mins; resting time between steps was of 5 mins. Aim of each step was that of obtaining a steady state condition. Steps were executed at the following intensities: step 1; 12 watts (the minimum external load provided by TE) step 2; at 50% of the previously evaluated VO\textsubscript{2max}; step 3; at 65% of the VO\textsubscript{2max}; step 4 at 80% of the VO\textsubscript{2max}. Overall, 200 steady state points were collected; at each steady state point a related O\textsubscript{2} consumption measured with the metabolic cart was associated.

RESULTS: The average VO\textsubscript{2max} was 43.3 ± 10.2 ml/kg/min. The steady state VO\textsubscript{2} at the four steps ranged from 13.6 to 40.8 ml/kg/min. For each of the 200 steady state points, the following variables were considered: O\textsubscript{2} Consumption (ml/kg/min); External Workload (Watts); Body Weight (kg). By using those variables, the equation that better predicts the actual O\textsubscript{2} consumption was: 7.27 + 0.12*Watt + 463/Body Weight. Applying this equation, the correlation with the VO\textsubscript{2} measured with the metabolic cart was r\textsuperscript{2}=0.9168.

CONCLUSIONS: The method developed by Technogym to create the ME that predicts on TE O\textsubscript{2} consumption and caloric expenditure from the external workload and subject’s body weight, provides a good estimate of the actual values.

Disclosures: S. Zanuso: Salary; I receive a Salary from Technogym.
INTRODUCTION: Body composition (percent body fat) can be estimated using different methodologies. The relative performance and agreement of estimates from various methods is generally known in the adult population. However, there is limited data regarding the relative performance of these methods in young athletes. PURPOSE: To compare four modalities of assessing body composition (percent body fat): Dual-Energy X-ray Absorptiometry (DXA); Air Displacement Plethysmography (AD); Bioelectrical Impedance Analysis (BIA); and circumferences measurements (CIR) in young athletes 13-18 years of age. METHODS: 308 competitive athletes (13-18 yrs; 261 male, 42 female; baseball n=51, basketball n=47, football n=20, golf n=35, lacrosse n=13, soccer n=86, tennis n=48, track and field n=1, triathlon n=1, volleyball n=1). Athletes were assessed for body composition (percent body fat) using four widely recognized methodologies: DXA, BIA, AD and CIR. All measurements were performed after a 10 h overnight fast and hydration status was assessed by urine specific gravity. RESULTS: Percent body fat (%) calculated from CIR was 12.42 ± 5.46 (n = 258) and 25.10 ± 3.38 (n = 41) in males and females respectively. Percent body fat calculated from DXA was 18.69 ± 5.95 (n = 249) and 27.66 ± 4.73 (n = 41) in males and females. Percent body fat calculated from BIA was 12.97 ± 5.83 (n = 241) and 21.13 ± 4.52 (n = 35) in males and females. Percent body fat calculated from AD was 15.41 ± 7.93 (n = 95) and 21.76 ± 5.93 (n = 16) in males and females. DXA correlated to AD in males (r = 0.95) and females (r = 0.92). DXA correlated to BIA in males (r = 0.87) and females (r = 0.67). DXA correlated to CIR in males (r = 0.77) and females (r = 0.60). AD correlated to BIA in males (r = 0.86) and females (r = 0.82). AD correlated to CIR in males (r = 0.70) and females (r = 0.88). BIA correlated to CIR in males (r = 0.77) and females (r = 0.64). CONCLUSION: The data in this study gives insight into the relationship between various body composition measurement methods in young male and female athletes. In young athletes, correlation between estimates from different methods appears somewhat dependent on sex. Researchers should consider this methodological variability when estimating body composition or assessing body composition estimates in published literature.
Abstract:
As the Trp64Arg polymorphism of the beta-3 adrenergic receptor (AR) gene is expressed mainly in visceral fat it is possible that it may cause development of visceral obesity, affect blood pressure (BP), lipid and glucose metabolism, and cause development of metabolic syndrome (Mets) and atherosclerosis in children.

[PURPOSE]
To determine what kind of association exists between the beta-3 AR gene polymorphism, the component factors of Mets, and atherosclerotic markers in Japanese children.

[METHODS]
The subjects were 68 obese (male:43) and 44 normal (male:27) children aged 7-12 years. The beta-3 AR gene polymorphism was detected by PCR-RFLP of buccal samples, and Trp-homozygotes (Trp/Trp), heterozygotes (Trp/Arg), and Arg-homozygotes (Arg/Arg) were genotyped. Percent body fat was measured by air-displacement plethysmography, sd-LDL particle size was taken as a marker characterizing the atherosclerotic process, and Mets components such as abdominal adiposity (visceral and subcutaneous fat area by MRI), systolic and diastolic BP, lipid profile (triglyceride (TG)), levels of high-density lipoprotein-cholesterol (HDL-C), and glucose profile (glucose, insulin) were measured.

[RESULTS]
The genotype frequencies were: Trp/Trp, 73.2%; Trp/Arg, 24.1%; and Arg/Arg, 2.7%, with allele frequencies of 0.85 for Trp64 and 0.15 for Arg64. Obese and normal children were divided into Arg carriers (Trp/Arg or Arg/Arg) and non-Arg carriers (Trp/Trp). The frequency of Arg carriers amongst obese children (27.3%) was significantly higher than in the normal group (4.3%) (p=0.006). Amongst obese children, Arg carriers had significantly higher visceral fat area (p=0.009), systolic blood pressure (p=0.028) and TG (p=0.040) and had smaller sd-LDL particle size (p=0.006) than did non-Arg carriers. No differences between the two obese groups were observed in terms of percent body fat, subcutaneous fat area, and levels of HDL-C, glucose and insulin.

[CONCLUSION]
These data support the hypothesis that beta-3 AR gene Trp64Arg polymorphism is a possible genetic factor involved in the abdominal accumulation of body fat, and that it causes development of Mets and atherosclerosis in Japanese children.
Abstract: We previously reported that the K4b² portable metabolic analyser (COSMED s.r.l, Rome, Italy) overestimated VO₂ during exercise following a one hour delay between calibration and measurement (Easton et al. 2012. Med Sci Sports Exerc 44(5): S434). However, newer models of the device are now fitted with a periodic auto-recalibration mechanism which may improve the stability of measurement accuracy. **PURPOSE:** To determine if the K4b² auto-recalibration mechanism enhances the stability of respiratory measurements during exercise. **METHODS:** Ten well-trained runners (8 males and 2 females; VO₂max 59 ± 10 ml·kg·min⁻¹) completed four maximal discontinuous incremental exercise tests (three on a motorized treadmill and one on a flat outdoor running trail) until volitional exhaustion in a randomised-crossover design. Starting at a walking speed of 4 km·hr⁻¹ and increasing by a speed of 1 then 2 km·hr⁻¹ for each stage, participants completed 3 min at each speed followed by 3 min active recovery for all speeds above 10 km·hr⁻¹. Respiratory variables were measured continuously during the treadmill trials using either a laboratory based metabolic cart (Oxycon Pro, Carefusion, Germany) (OP), a K4b² calibrated immediately before use (K4b²) or a K4b² calibrated one hour prior to the test (K4b²DEL). The K4b² was also used during the outdoor trial. Differences between trials were assessed using two-way repeated measures ANOVA and agreement between methods assessed using Bland and Altman analysis. **RESULTS:** There were no differences in VO₂, VCO₂ or VE between the OP, K4b², K4b²DEL or outdoor trials (all P>0.05). There was good agreement in the measurement of VO₂ between the OP and K4b² (mean bias [MB] 58 ml·min⁻¹ and limits of agreement [LOA] -264 to 323 ml·min⁻¹), OP and K4b²DEL (MB 36 ml·min⁻¹ and LOA -272 to 344 ml·min⁻¹) and OP and outdoor trials (MB 71 ml·min⁻¹ and LOA -428 to 570 ml·min⁻¹) with similar findings for VCO₂ and VE. **CONCLUSION:** In agreement with previous research these data suggest that the K4b² portable metabolic analyser provides accurate measurements of VO₂, VCO₂ and VE during both treadmill-based and outdoor exercise tests. Furthermore, the addition of the auto-recalibration mechanism to the K4b² improves the stability of respiratory measurements for exercise tests lasting up to one hour in duration.
Session: G-17-Fat Metabolism

Saturday, Jun 01, 2013, 7:30 AM -11:00 AM

Presentation: 2793 - Paleolithic Diet Is Associated With Unfavorable Changes To Blood Lipids In Healthy Subjects

Location: Hall C, Poster Board: 97

Pres. Time: Saturday, Jun 01, 2013, 9:30 AM -11:00 AM

Category: 607. Metabolism and Nutrition - nutritional intervention – micro and macronutrients

Keywords: Paleo; Cholesterol; CrossFit

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Abstract:

PURPOSE: To examine the influence of a Paleolithic (Paleo) diet on blood lipids including high density lipoprotein (HDL), low density lipoprotein (LDL), non-HDL cholesterol, triglycerides (TG), total cholesterol (TC) and the ratio between TC and HDL (TC/HDL) in a healthy population.

METHODS: Subjects of both sexes (23 males, 20 females) with no history of diabetes, heart disease, dyslipidemia, or other metabolic disease were instructed to eat a Paleo diet with no macronutrient recommendations consisting of meat, fish, fruit, vegetables, root vegetables, eggs, and nuts for 10 weeks. Subjects participated in a high-intensity circuit training program throughout the intervention. Prior to the dietary intervention, body fat percentage (BF%) was estimated using whole body plethysmography, maximal oxygen consumption (VO₂max) was measured (Bruce treadmill protocol), and TC, TG, and HDL were measured using a point of care device, while LDL was estimated using the Friedwald equation. All measurements were repeated following 10 weeks of a Paleo diet.

RESULTS: In healthy subjects following a Paleo diet there was a significant increase in n-HDL (107.1 ± 6.0 mg/dL to 120.2 ± 6.5 mg/dL; P < 0.01), LDL (93.1 ± 5.4 mg/dL to 105.6 ± 6.1 mg/dL; P < 0.01), and TC (168.8 ± 5.4 mg/dL to 178.9 ± 6.6 mg/dL; P < 0.05). When stratified into groups based on initial blood lipid levels, deleterious changes were found in those with optimal HDL (82.1 ± 3.2 mg/dL to 68.6 ± 4.8 mg/dL; P < 0.05), n-HDL (86.6 ± 3.9 mg/dL to 101.4 ± 4.8 mg/dL; P < 0.01), TC/HDL (2.5 ± 0.1 to 2.7 ± 0.1; P < 0.05), and LDL (69.1 ± 3.1 mg/dL to 83.5 ± 4.1 mg/dL; P < 0.01). Subjects within sub-optimal stratifications showed no significant changes. Further, BF% decreased significantly (24.32 ± 7.63 % to 20.65 ± 7.99 %; P < 0.01), and VO₂max increased significantly (39.82 ± 7.72 mL/kg/min to 44.90 ± 8.20 mL/kg/min; P < 0.01).

CONCLUSION: Our results demonstrate an ad libitum Paleo diet intervention is associated with deleterious changes to blood lipids in healthy subjects, even as subjects simultaneously improved body composition and VO₂max. Future research should continue to focus on determining recommendations that embrace the metabolic benefit associated with the Paleo diet, while minimizing any deleterious impact on blood lipids in a healthy population.

Disclosures: E.T. Trexler: None.

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